Rappahannock Tidal River
2008

Introduction

Investigations of the fisheries resources of the Rappahannock system are usually stratified between tidal and non-tidal because of differences in habitat, associated fish communities and survey gear selection. This report concerns the tidal (hereafter referred to as "lower" waters) with emphasis on largemouth bass. A companion report under different cover concerns the nontidal (or "upper" waters) with emphasis on smallmouth bass. This report covers the lower Rappahannock River from Fredericksburg to Port Royal. Waters below Port Royal are managed from the Region 1 Headquarters Office. Anadromous species (American shad, hickory shad, blueback herring, alewife and striped bass) are not covered in this report, as sampling and stocking were coordinated and conducted primarily by the fish passage and shad specialists and will be covered under separate reports.

Access

Access to the lower Rappahannock River is available at the City Dock in Fredericksburg, the Stafford County Little Falls facility off Route 3 east of Fredericksburg, Hick's Landing (540-742-5210) off Route 17 in Caroline County and at the Port Royal Fish House off U.S. 301. There is also a new ramp in King George County that may be acquired by VDGIF. All ramps on the lower Rappahannock River can accommodate trailers.

Methods

On the lower Rappahannock River, annual multi-station electrofishing began in 2003 and continued through 2007. Six sites are sampled by large boat electrofishing (with a pick-up boat) each September. Sampling sites are located near the City Dock, Massaponax Creek, Hollywood Bend, Skinkers's Neck, Hopyard and Moons Wharf. Three 1200-second electrofishing runs are made at each site annually, and all species are collected, measured for total length and released back into the river. Periodically, samples of game species are transported to a laboratory for more detailed examination including weight, otolith extraction, and diet analysis. No creel survey has ever been conducted on the lower Rappahannock, nor is one currently planned due to budget constraints.

Results

Fisheries studies here have included all species as well but focused primarily on largemouth bass. As with smallmouth bass, three primary factors govern the density and size structure of this population: recruitment, growth and mortality.

Largemouth bass recruitment (the number of fish spawned and surviving to enter the adult population) was highly variable in the lower Rappahannock based on catch curves from population age structure. (Catch curves are a snapshot of age structure based on fish present in the population at a given time.) In fact, variability was generally much greater in tidal rivers than in reservoirs statewide. This variability was similar, but more dramatic, to that observed in smallmouth bass populations in Virginia rivers. Additionally, data time series were more limited (5 years for largemouth bass vs. 11 years for smallmouth bass) in the lower Rappahannock River making recruitment analysis more difficult. It was likely that variability in largemouth bass recruitment was related to river flow (or lack thereof), but additional factors such as salinity (although flow related) and changes to habitat components (such as aquatic vegetation) were likely important. Over the past five years, the weakest year class (based on collection of age-0 fish *and* catch curves from the adult population) was, by far, 2003 when mean annual flow in the Rappahannock River was 3873 CFS. Catch of age-0 fish is probably a better indicator of spawning success (or year class strength) than catch curves due to the variability of spawning success (Table 1). Since 2003, spawns have been much better, and mean annual flow averaged 1658 CFS. Thus, flows are likely the principle mechanism for recruitment success (as with smallmouth bass), and excessive flows appeared to be damaging. However, several poor year classes were thought to have occurred during the period 1999-2002 (primarily drought years) when the maximum mean annual flow was 1058 CFS. Although sampling was not conducted during "the drought years" (for age-0 CPUE), catch curves ("snapshots" of the population based on the age structure of the population at a given time) support the hypothesis that most spawns were poor then. As more data are collected, a refinement in the relationship between flow and recruitment will likely emerge. It is also likely a portion of a given year's flow (e.g., with smallmouth bass the month of June) plays a greater role than flow overall. Fortunately, there have been four moderate to strong year classes since 2004, and the largemouth bass population should continue to improve. Most largemouth bass were found associated with large woody debris (natural such as blow downs or man-made such as docks) and emergent aquatic vegetation (such as spatterdock beds). Depending on tidal stage, bass were also strongly associated with tributary creek mouths.

Largemouth bass in the lower Rappahannock River grew rapidly (Table 2) although not as fast as in the tidal James River. For example, age-3 fish in the Rappahannock River averaged 14.3" compared to over 15" in the James River. However, compared to largemouth bass in reservoirs, Rappahannock River fish grew well. In Lake Anna (a "good" bass growth rate lake), age-3 fish averaged 13.0". The forage base was large and diverse, as bass evaluated for food habits had consumed 14 different species of fish and crayfish. The top five items most commonly found (in decreasing order of abundance) were: crayfish, white perch, spottail shiner, blue catfish and blueback herring.

Mortality rates can be computed several ways, and a few more years of data are needed for accurate estimation of total annual mortality rate of largemouth bass. The portion of the population that dies each year (total annual mortality) is made up of fishing and natural mortality. It is believed, based on tentative analysis, that natural mortality rate of largemouth bass in the Rappahannock River is relatively low. This feature, coupled with fast growth, should enable the population to continue a rapid recovery. Largemouth bass catch rate in electrofishing samples reached a record level in 2006 (22/hour) and stayed high in 2007 (Table 3). Size structure of the population also changed over time, as the index Relative Stock Density of Preferred fish, or RSD-P (a ratio of adult fish that were 15" or greater) reached a record high (50) in 2004. Simply stated, the higher the RSD value, the higher the percentage of large fish in the population (15" is the nationally accepted standard for "preferred" size largemouth bass). The index declined after 2004 due to the strong contributions from several year classes that had recruited to the population but not yet reached 15". RSD-P index should increase over the next few years, and anglers should find largemouth bass more plentiful and larger.

Smallmouth bass were also encountered during sampling on the lower Rappahannock, but their abundance was very low compared to largemouth bass. The most abundant species overall (based on electrofishing in decreasing order) were blue catfish, bluegill, white perch, gizzard shad and channel catfish. Abundances of these species over the past five years were cyclic, and no overall trends were apparent. Channel catfish abundance may have declined as blue catfish abundance increased, but more data are needed to evaluate this potential trend. Mean catch rates for blue and channel catfish were 443 and 185 fish/hr. Gizzard shad catch rate was highly variable (0-200 fish/hr), which was normal for a schooling forage fish. Black crappie abundance was low at 4 fish/hr (compared to reservoir sampling), but size structure was excellent. Waters beneath the Route 301 Bridge (especially the eastern supports) routinely held good numbers of very large crappie. Abundance of bowfin, a native predator, was low (3 fish/hr). However, size structure of bowfin was also excellent including several near citations.

Table 1. Mean catch per unit effort (CPUE – fish/hr) of juvenile (age-0) largemouth bass at six sites on the lover Rappahannock River system.

2003	2004	2005	2006	2007
1	5	6	5	6

Table 2. Largemouth bass growth rate (length-at-age) for fish collected fall, 2007 on the tidal Rappahannock River system (Mean=mean total length in inches).

Age	0	1	2	3	4	5	6	7	8	9	10	11
Mean	5.9	9.6	12.5	14.3	17.1	16.2	17.3	18.7	19.1			21.7

Table 3. Largemouth bass abundance (CPUE, or catch per unit effort) based on number collected per hour of electrofishing at six sites on the Rappahannock River system with percentage of adult population > 15” (RSD-P, relative stock density - preferred).

Year	2003	2004	2005	2006	2007
CPUE	9	15	18	22	20
RSD-P	45%	50%	44%	31%	25%

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